Literature Review

The effect of Failure Drainage System.

Flooding identifies as a wastewater that cannot enter a sewer system and remains on the surface or enters buildings. The proper design of drainage system should be done to avoid the flooding. Depend on type of urban area and traffic infrastructure served the urban drainage systems have to be designed to withstand periods of flooding in the period of 10–50 years,([CEN, 1996](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V6C-4DB59YC-6&_user=4406426&_coverDate=12%2F01%2F2004&_alid=1427153480&_rdoc=1&_fmt=high&_orig=search&_cdi=5811&_sort=r&_docanchor=&view=c&_ct=1623&_acct=C000063100&_version=1&_urlVersion=0&_userid=4406426&md5=ecb092ebc29f4909f29ebb657138500f" \l "bbib4) CEN, Drain and sewer systems outside buildings—Part 2: Performance Requirements, *European Standard, European Committee for Standardization CEN, Brussels, Belgium* (1996).[Cen, 1996](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V6C-4DB59YC-6&_user=4406426&_coverDate=12%2F01%2F2004&_alid=1427153480&_rdoc=1&_fmt=high&_orig=search&_cdi=5811&_sort=r&_docanchor=&view=c&_ct=1623&_acct=C000063100&_version=1&_urlVersion=0&_userid=4406426&md5=ecb092ebc29f4909f29ebb657138500f#bib4),1997). According to [ATV, 1999](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V6C-4DB59YC-6&_user=4406426&_coverDate=12%2F01%2F2004&_alid=1427153480&_rdoc=1&_fmt=high&_orig=search&_cdi=5811&_sort=r&_docanchor=&view=c&_ct=1623&_acct=C000063100&_version=1&_urlVersion=0&_userid=4406426&md5=ecb092ebc29f4909f29ebb657138500f#bib3) and [Schmitt, 2001](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V6C-4DB59YC-6&_user=4406426&_coverDate=12%2F01%2F2004&_alid=1427153480&_rdoc=1&_fmt=high&_orig=search&_cdi=5811&_sort=r&_docanchor=&view=c&_ct=1623&_acct=C000063100&_version=1&_urlVersion=0&_userid=4406426&md5=ecb092ebc29f4909f29ebb657138500f" \l "bbib10) T.G. Schmitt, Evaluating hydraulic performance of sewer systems according to European Standard EN 752, *Water21, Magazine of the International Water Association, London* (2001) pp. 29–32.[Schmitt, 2001](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V6C-4DB59YC-6&_user=4406426&_coverDate=12%2F01%2F2004&_alid=1427153480&_rdoc=1&_fmt=high&_orig=search&_cdi=5811&_sort=r&_docanchor=&view=c&_ct=1623&_acct=C000063100&_version=1&_urlVersion=0&_userid=4406426&md5=ecb092ebc29f4909f29ebb657138500f#bib10), the German standard ATV-A 118 ‘Hydraulic simulation and design of drainage systems’ considering the frequency of flood to be inappropriate for direct computational assessment. In modeling the new drainage system, [Djordjevic et al., 1999](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V6C-4DB59YC-6&_user=4406426&_coverDate=12%2F01%2F2004&_alid=1427153480&_rdoc=1&_fmt=high&_orig=search&_cdi=5811&_sort=r&_docanchor=&view=c&_ct=1623&_acct=C000063100&_version=1&_urlVersion=0&_userid=4406426&md5=ecb092ebc29f4909f29ebb657138500f#bib6), claim, the drain systems is denoted as ‘dual drainage modeling’ with flow components on the surface and underground. The surface flow the vertical dimension is much smaller than typical horizontal scale allows a simplified two-dimensional representation, the so-called ‘shallow water flow equations’ ([Hilden, 2003](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V6C-4DB59YC-6&_user=4406426&_coverDate=12%2F01%2F2004&_alid=1427153480&_rdoc=1&_fmt=high&_orig=search&_cdi=5811&_sort=r&_docanchor=&view=c&_ct=1623&_acct=C000063100&_version=1&_urlVersion=0&_userid=4406426&md5=ecb092ebc29f4909f29ebb657138500f" \l "bbib7) Hilden, M., (2003): Extensions of Shallow Water Equations. PhD Thesis, Department of Mathematics, Kaiserslautern University.[Hilden, 2003](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V6C-4DB59YC-6&_user=4406426&_coverDate=12%2F01%2F2004&_alid=1427153480&_rdoc=1&_fmt=high&_orig=search&_cdi=5811&_sort=r&_docanchor=&view=c&_ct=1623&_acct=C000063100&_version=1&_urlVersion=0&_userid=4406426&md5=ecb092ebc29f4909f29ebb657138500f#bib7)).

Flooding happened went direct delivery of material true the channel due to landslides. In Hong Kong landslides received much attention in the literature [Lumb, 1975](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VHG-4FHRPT9-2&_user=4406426&_coverDate=08%2F31%2F2005&_alid=1428285204&_rdoc=1&_fmt=high&_orig=search&_cdi=6066&_sort=r&_docanchor=&view=c&_ct=147&_acct=C000063100&_version=1&_urlVersion=0&_userid=4406426&md5=b900fcf4b6af0d423ae019a3b0deccea#bib64) and [Brand, 1984](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VHG-4FHRPT9-2&_user=4406426&_coverDate=08%2F31%2F2005&_alid=1428285204&_rdoc=1&_fmt=high&_orig=search&_cdi=6066&_sort=r&_docanchor=&view=c&_ct=147&_acct=C000063100&_version=1&_urlVersion=0&_userid=4406426&md5=b900fcf4b6af0d423ae019a3b0deccea#bib9),claim this reflects the fact that they occur frequently because they pose a hazard ([So, 1976](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VHG-4FHRPT9-2&_user=4406426&_coverDate=08%2F31%2F2005&_alid=1428285204&_rdoc=1&_fmt=high&_orig=search&_cdi=6066&_sort=r&_docanchor=&view=c&_ct=147&_acct=C000063100&_version=1&_urlVersion=0&_userid=4406426&md5=b900fcf4b6af0d423ae019a3b0deccea" \l "bib94), [Brand, 1985](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VHG-4FHRPT9-2&_user=4406426&_coverDate=08%2F31%2F2005&_alid=1428285204&_rdoc=1&_fmt=high&_orig=search&_cdi=6066&_sort=r&_docanchor=&view=c&_ct=147&_acct=C000063100&_version=1&_urlVersion=0&_userid=4406426&md5=b900fcf4b6af0d423ae019a3b0deccea#bib7), [Choot, 1993](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VHG-4FHRPT9-2&_user=4406426&_coverDate=08%2F31%2F2005&_alid=1428285204&_rdoc=1&_fmt=high&_orig=search&_cdi=6066&_sort=r&_docanchor=&view=c&_ct=147&_acct=C000063100&_version=1&_urlVersion=0&_userid=4406426&md5=b900fcf4b6af0d423ae019a3b0deccea" \l "bib14), [Tang, 1993](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VHG-4FHRPT9-2&_user=4406426&_coverDate=08%2F31%2F2005&_alid=1428285204&_rdoc=1&_fmt=high&_orig=search&_cdi=6066&_sort=r&_docanchor=&view=c&_ct=147&_acct=C000063100&_version=1&_urlVersion=0&_userid=4406426&md5=b900fcf4b6af0d423ae019a3b0deccea" \l "bib96), [Malone, 1998](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VHG-4FHRPT9-2&_user=4406426&_coverDate=08%2F31%2F2005&_alid=1428285204&_rdoc=1&_fmt=high&_orig=search&_cdi=6066&_sort=r&_docanchor=&view=c&_ct=147&_acct=C000063100&_version=1&_urlVersion=0&_userid=4406426&md5=b900fcf4b6af0d423ae019a3b0deccea" \l "bib66), [Hadley et al., 1998](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VHG-4FHRPT9-2&_user=4406426&_coverDate=08%2F31%2F2005&_alid=1428285204&_rdoc=1&_fmt=high&_orig=search&_cdi=6066&_sort=r&_docanchor=&view=c&_ct=147&_acct=C000063100&_version=1&_urlVersion=0&_userid=4406426&md5=b900fcf4b6af0d423ae019a3b0deccea" \l "bib42) and [Dai et al., 2002](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VHG-4FHRPT9-2&_user=4406426&_coverDate=08%2F31%2F2005&_alid=1428285204&_rdoc=1&_fmt=high&_orig=search&_cdi=6066&_sort=r&_docanchor=&view=c&_ct=147&_acct=C000063100&_version=1&_urlVersion=0&_userid=4406426&md5=b900fcf4b6af0d423ae019a3b0deccea" \l "bib17)) and have a long history ([Uglow, 1926](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VHG-4FHRPT9-2&_user=4406426&_coverDate=08%2F31%2F2005&_alid=1428285204&_rdoc=1&_fmt=high&_orig=search&_cdi=6066&_sort=r&_docanchor=&view=c&_ct=147&_acct=C000063100&_version=1&_urlVersion=0&_userid=4406426&md5=b900fcf4b6af0d423ae019a3b0deccea" \l "bib100) and [Brand, 1985](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VHG-4FHRPT9-2&_user=4406426&_coverDate=08%2F31%2F2005&_alid=1428285204&_rdoc=1&_fmt=high&_orig=search&_cdi=6066&_sort=r&_docanchor=&view=c&_ct=147&_acct=C000063100&_version=1&_urlVersion=0&_userid=4406426&md5=b900fcf4b6af0d423ae019a3b0deccea#bib7)). The investigation have been made and it focused upon the role of rainfall triggering landslides, (e.g. [So, 1971](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VHG-4FHRPT9-2&_user=4406426&_coverDate=08%2F31%2F2005&_alid=1428285204&_rdoc=1&_fmt=high&_orig=search&_cdi=6066&_sort=r&_docanchor=&view=c&_ct=147&_acct=C000063100&_version=1&_urlVersion=0&_userid=4406426&md5=b900fcf4b6af0d423ae019a3b0deccea#bib93), [Lumb, 1975](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VHG-4FHRPT9-2&_user=4406426&_coverDate=08%2F31%2F2005&_alid=1428285204&_rdoc=1&_fmt=high&_orig=search&_cdi=6066&_sort=r&_docanchor=&view=c&_ct=147&_acct=C000063100&_version=1&_urlVersion=0&_userid=4406426&md5=b900fcf4b6af0d423ae019a3b0deccea" \l "bib64), [Brand et al., 1984](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VHG-4FHRPT9-2&_user=4406426&_coverDate=08%2F31%2F2005&_alid=1428285204&_rdoc=1&_fmt=high&_orig=search&_cdi=6066&_sort=r&_docanchor=&view=c&_ct=147&_acct=C000063100&_version=1&_urlVersion=0&_userid=4406426&md5=b900fcf4b6af0d423ae019a3b0deccea" \l "bib9), [Brand, 1994](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VHG-4FHRPT9-2&_user=4406426&_coverDate=08%2F31%2F2005&_alid=1428285204&_rdoc=1&_fmt=high&_orig=search&_cdi=6066&_sort=r&_docanchor=&view=c&_ct=147&_acct=C000063100&_version=1&_urlVersion=0&_userid=4406426&md5=b900fcf4b6af0d423ae019a3b0deccea" \l "bib8), [Au, 1993](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VHG-4FHRPT9-2&_user=4406426&_coverDate=08%2F31%2F2005&_alid=1428285204&_rdoc=1&_fmt=high&_orig=search&_cdi=6066&_sort=r&_docanchor=&view=c&_ct=147&_acct=C000063100&_version=1&_urlVersion=0&_userid=4406426&md5=b900fcf4b6af0d423ae019a3b0deccea" \l "bib2) and [Premchitt et al., 1994](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VHG-4FHRPT9-2&_user=4406426&_coverDate=08%2F31%2F2005&_alid=1428285204&_rdoc=1&_fmt=high&_orig=search&_cdi=6066&_sort=r&_docanchor=&view=c&_ct=147&_acct=C000063100&_version=1&_urlVersion=0&_userid=4406426&md5=b900fcf4b6af0d423ae019a3b0deccea" \l "bib82)). From the research that have bee made by [Allen and Stephens, 1971](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VHG-4FHRPT9-2&_user=4406426&_coverDate=08%2F31%2F2005&_alid=1428285204&_rdoc=1&_fmt=high&_orig=search&_cdi=6066&_sort=r&_docanchor=&view=c&_ct=147&_acct=C000063100&_version=1&_urlVersion=0&_userid=4406426&md5=b900fcf4b6af0d423ae019a3b0deccea#bib1), [Dai et al., 1999](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VHG-4FHRPT9-2&_user=4406426&_coverDate=08%2F31%2F2005&_alid=1428285204&_rdoc=1&_fmt=high&_orig=search&_cdi=6066&_sort=r&_docanchor=&view=c&_ct=147&_acct=C000063100&_version=1&_urlVersion=0&_userid=4406426&md5=b900fcf4b6af0d423ae019a3b0deccea" \l "bib18), [Ruse et al., 2002](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VHG-4FHRPT9-2&_user=4406426&_coverDate=08%2F31%2F2005&_alid=1428285204&_rdoc=1&_fmt=high&_orig=search&_cdi=6066&_sort=r&_docanchor=&view=c&_ct=147&_acct=C000063100&_version=1&_urlVersion=0&_userid=4406426&md5=b900fcf4b6af0d423ae019a3b0deccea" \l "bib87) and [Ng, 2002,](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VHG-4FHRPT9-2&_user=4406426&_coverDate=08%2F31%2F2005&_alid=1428285204&_rdoc=1&_fmt=high&_orig=search&_cdi=6066&_sort=r&_docanchor=&view=c&_ct=147&_acct=C000063100&_version=1&_urlVersion=0&_userid=4406426&md5=b900fcf4b6af0d423ae019a3b0deccea" \l "bib69) they found a evidence that landslides on undeveloped terrain tend to be shallow and generally of small volume. Brand suggests that landslides are an essential process on slope whilst, [Fyfe et al. (2000)](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VHG-4FHRPT9-2&_user=4406426&_coverDate=08%2F31%2F2005&_alid=1428285204&_rdoc=1&_fmt=high&_orig=search&_cdi=6066&_sort=r&_docanchor=&view=c&_ct=147&_acct=C000063100&_version=1&_urlVersion=0&_userid=4406426&md5=b900fcf4b6af0d423ae019a3b0deccea" \l "bib31) said, mass movement phenomena are one of the two main categories of erosion slope processes in Hong Kong. It is primary to consider the linkage between landslides and the sewer system, as in Hong Kong sediment has been demonstrated to have an impact upon aquatic ecology (e.g. [Dudgeon, 1994](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VHG-4FHRPT9-2&_user=4406426&_coverDate=08%2F31%2F2005&_alid=1428285204&_rdoc=1&_fmt=high&_orig=search&_cdi=6066&_sort=r&_docanchor=&view=c&_ct=147&_acct=C000063100&_version=1&_urlVersion=0&_userid=4406426&md5=b900fcf4b6af0d423ae019a3b0deccea" \l "bib22)).

The researcher, [Bloch, 1999](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VHC-4KR3JNB-2&_user=4406426&_coverDate=08%2F31%2F2007&_alid=1428293912&_rdoc=16&_fmt=high&_orig=search&_cdi=6063&_sort=r&_docanchor=&view=c&_ct=148226&_acct=C000063100&_version=1&_urlVersion=0&_userid=4406426&md5=84207ebdf92e1fdb57b6b2e8d933343e#bib4), claim that the overall management of river basins gained importance during the last years. The European water framework directive (WFD), requested put on the emphasis to improving the receiving water quality as well as on river basins management. Both aspects require a difference in the design procedures for urban drainage systems. The design rules based on emission criteria does not necessarily lead to an improvement of the water quality ([Lau et al., 2002](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VHC-4KR3JNB-2&_user=4406426&_coverDate=08%2F31%2F2007&_alid=1428293912&_rdoc=16&_fmt=high&_orig=search&_cdi=6063&_sort=r&_docanchor=&view=c&_ct=148226&_acct=C000063100&_version=1&_urlVersion=0&_userid=4406426&md5=84207ebdf92e1fdb57b6b2e8d933343e" \l "bib12) and [Lijklema, 1995](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VHC-4KR3JNB-2&_user=4406426&_coverDate=08%2F31%2F2007&_alid=1428293912&_rdoc=16&_fmt=high&_orig=search&_cdi=6063&_sort=r&_docanchor=&view=c&_ct=148226&_acct=C000063100&_version=1&_urlVersion=0&_userid=4406426&md5=84207ebdf92e1fdb57b6b2e8d933343e" \l "bib13)). The assessment based on an evaluation of frequency, magnitude and duration of the impact (see e.g. [Harremoës and Rauch, 1996](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VHC-4KR3JNB-2&_user=4406426&_coverDate=08%2F31%2F2007&_alid=1428293912&_rdoc=16&_fmt=high&_orig=search&_cdi=6063&_sort=r&_docanchor=&view=c&_ct=148226&_acct=C000063100&_version=1&_urlVersion=0&_userid=4406426&md5=84207ebdf92e1fdb57b6b2e8d933343e#bib10)) and need a statistical interpretation Software tools are required for the application in practice, that are capable of modeling urban drainage systems (including the receiving water) in an integrated manner. Basic idea of CITY DRAIN is to create an open source toolbox for integrated modeling of urban drainage systems. Different subsystems should be freely warrantable and connectible to each for describing an integrated urban drainage system and the fluxes of water and matter. CITY DRAIN © is a software tool based on Matlab/Simulink ©. Simple models are implemented allowing the integrated modeling of urban drainage systems including the receiving water.

The failure of drainage systems in urban areas causes flooding and will impact a large damage at buildings and other public and private infrastructure. Others, the traffic systems will not functioning due to the street flooding and also indirect consequences such as loss of opportunity and business. The studies about the failure of drainage system is very important, the effect from the failure drainage system is quite dangerous.

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